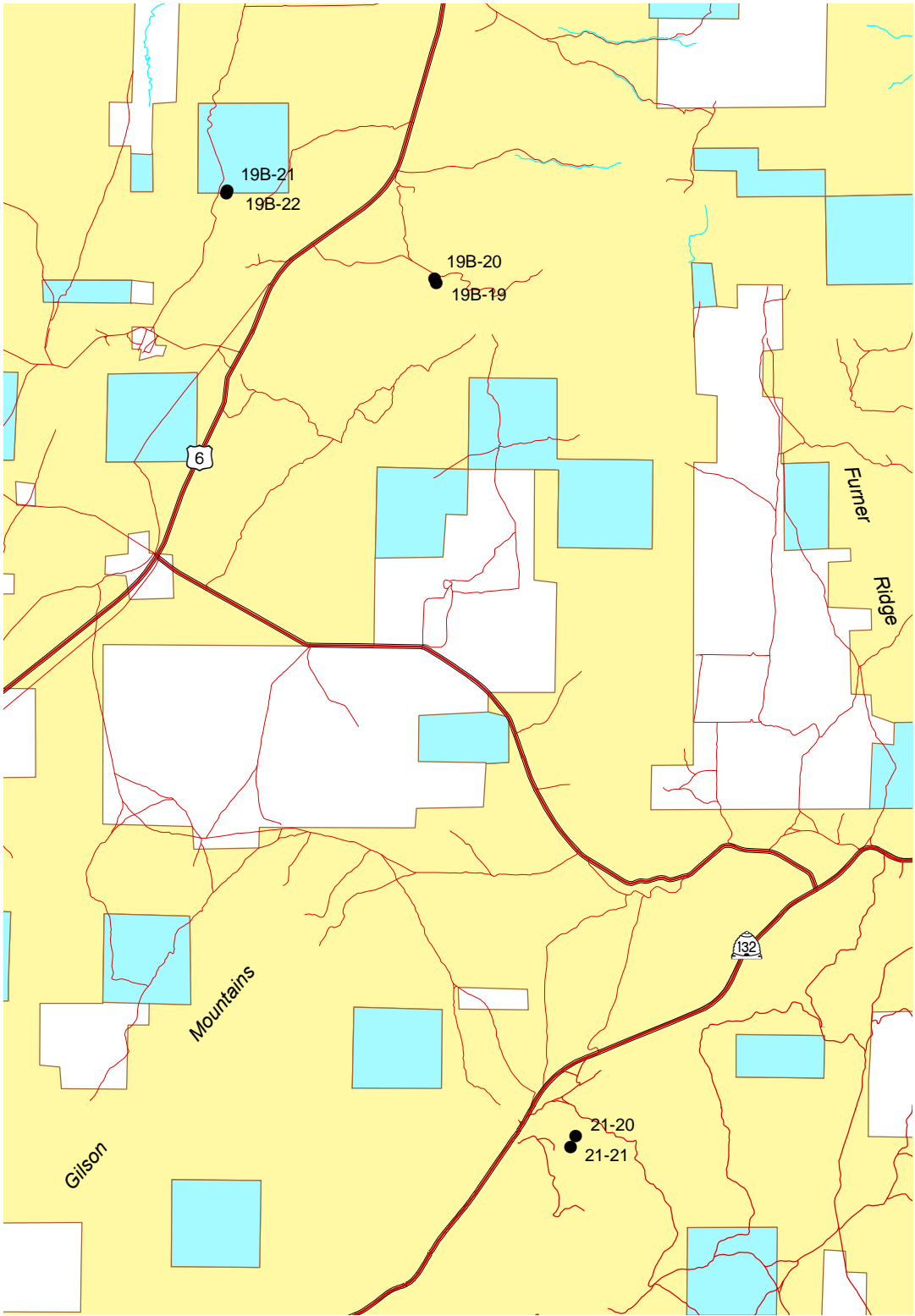


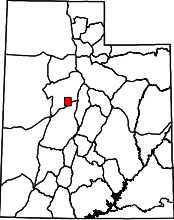
Burn Rehab Treatment Area



Map Scale 1:115,249 (1 inch = 1.8 miles)

Map Location

- BLM
- State of Utah
- Private Land
- Water Body
- Major Road
- Minor Road
- Water Course



Leamington Burn Complex Special Projects

Introduction

In 1996, Utah experienced its most active, extensive, and devastating fire season in history. In Millard and Juab Counties alone, some 250,000 acres were burned. The Leamington complex was the largest burned area covering approximately 138,340 acres of mostly pinyon-juniper woodland. Rehabilitation efforts began in the fall of 1996 which included drilling the more accessible low-lying areas, with the remainder being aerially seeded and one-way chained to cover the seed and enhance establishment of the seeded species. On the Leamington complex, about 6,100 acres were treated with a rangeland drill, 10,736 acres were aerial seeded and one-way chained, and 8,308 acres were aerially seeded only. Aerially seeding and then chaining is an effective method of breaking up burned trees which provide valuable surface litter to help protect the soil from erosion and it enhances seed establishment by covering the seed. This practice was stopped temporarily because of concerns voiced by environmental and Native American groups with regard to archeological resources in the burned areas even though an archeological survey had been completed. During the summer of 1997, two study sites were established, Leamington burn and Leamington burn & chain. One was placed in a burned and seeded area, and the other established in the immediate area where it had been burned, seeded, then chained one-way. Two additional pairs of sites was established in 1998 at Paul Bunyan and near the Jericho sheep shearing sheds to monitor the same treatment effects as the Leamington sites. The purpose of these sites was to monitor the recovery of these areas following rehabilitation using seeding alone compared to seeding and chaining.

Seed Lists

Paul Bunyan Burn (19B-19) and Paul Bunyan Burn & Chain (19B-20)

Aerial Mix

Species	Pounds of Seed	Pounds per acre
High Crest (<i>Agropyron cristatum</i>)	15,100	4.0
Rye (<i>Elymus junceus</i>)	11,350	3.0
Tall wheatgrass (<i>Agropyron elongatum</i>)	7,500	2.0

Dribbler Mix

Fourwing saltbush (<i>Atriplex canescens</i>)	3,800	1.0
---	-------	-----

Jericho State Section (19B-21)

Aerial Mix

Species	Pounds per acre
High Crest (<i>Agropyron cristatum</i>)	5
Intermediate Wheatgrass (<i>Agropyron intermedium</i>)	3
Alfalfa (<i>Medicago sativa</i>)	1
Yellow Sweet Clover (<i>Melilotus officinalis</i>)	0.5

Jericho BLM (19B-22)

Aerial Mix

Species	Pounds of Seed	Pounds per acre
High Crest (<i>Agropyron cristatum</i>)	6,550	3.1
Rye (<i>Elymus junceus</i>)	4,400	2.1
Tall wheatgrass (<i>Agropyron elongatum</i>)	4,250	2.0
Smooth Brome (<i>Bromus inermis</i>)	4,000	1.9

Dribbler Mix

Fourwing saltbush (<i>Atriplex canescens</i>)	2,150	1.0
---	-------	-----

Leamington Burn (21-20) and Leamington Burn & Chain (21-21)

Aerial Mix

Species	Pounds of seed	lbs/acre
High Crest (<i>Agropyron cristatum</i>)	12,450	3.3
Rye (<i>Elymus junceus</i>)	12,450	3.3
Tall wheatgrass (<i>Agropyron elongatum</i>)	8,300	2.2
Great Basin Wildrye (<i>Elymus cinereus</i>)	2,000	0.53
Smooth brome (<i>Bromus inermis</i>)	600	0.16
Alfalfa (<i>Medicago sativa</i>)	1,200	0.32
Small burnet (<i>Sanguisorba minor</i>)	500	0.13

Dribbler Mix

Fourwing saltbush (<i>Atriplex canescens</i>)	3,700	1.0
---	-------	-----

Trend Study 21-20-02

Study site name: Leamington Burn.

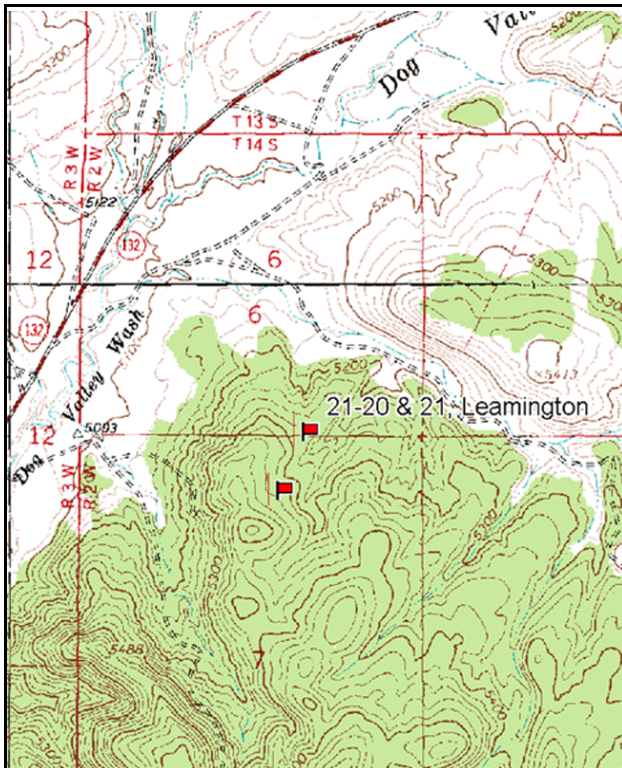
Vegetation type: Burned Pinyon-Juniper.

Compass bearing: frequency baseline 286 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Rebar: belt 4 on 1ft.

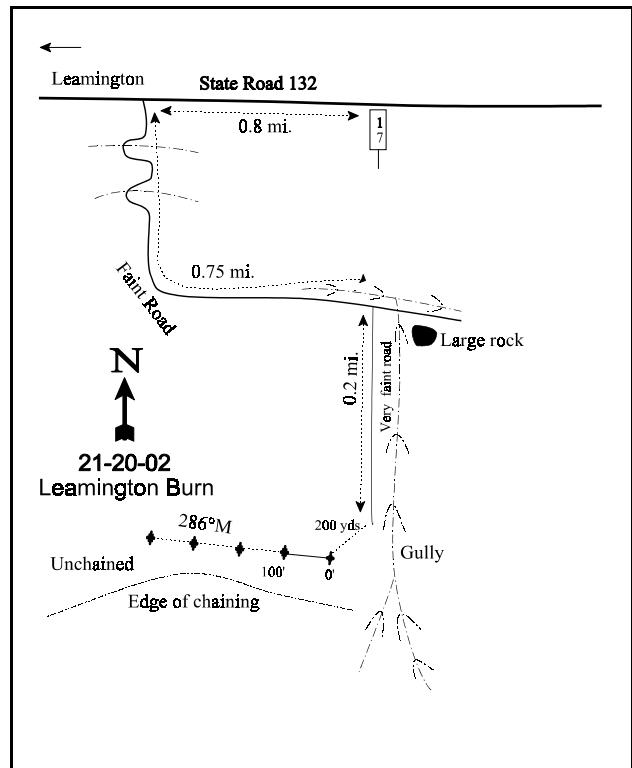
LOCATION DESCRIPTION

From Nephi, drive about 17.1 miles on State Road 132. Drive west 0.8 miles past mile marker 17 to a faint road on the left. Drive 0.75 miles past a water trough to a gully with a large boulder by the road. Go up the gully 0.2 miles to where it forks. Park here. The study is located on the ridge west of the gully. From the fork, the study is 200 yards away by the edge of the chaining. The study is marked by 12-18 inch, green, steel fenceposts.



Map Name: Sage Valley.

Township 14S Range 2W Section 6



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4385968 N 404471 E

DISCUSSION

Leamington Burn - Trend Study No. 21-20

This study was established in 1997 on a burned and seeded pinyon-juniper area. It occurs on BLM land about 17 miles west of Nephi and approximately one mile south of SR-132. It is part of the extensive Leamington burn complex that took place during the summer of 1996. This site samples a burned site that was aerially seeded and not chained. The paired site (study 21-21) to this samples a burned area that was aerially seeded then chained. The purpose of these paired studies is to contrast the difference in seeded species establishment and recovery between the two treatments. Pellet group data in 1998 indicated light use of the area by elk with five elk days use/acre (12 edu/ha) being estimated. Wildlife use remained very light with less than one deer day use/acre (2 ddu/ha) and one elk day use/acre (3 edu/ha) being estimated from pellet group transect data in 2002. Livestock were on the site when it was read in 2002. Cattle use was estimated at 13 days use/acre (32 ddu/ha) on the site itself, but use was much heavier in the bottoms near the road.

This site was placed on a ridge that slopes gently (3% to 5%) to the southeast. Elevation is about 5,200 feet. Soil is relatively deep with an effective rooting depth estimated at 14 inches. Texture is a sandy clay loam with a neutral pH (7.0). The soil is loose and lacks structure on the surface. Rocks and pavement are common on the surface and within the profile. Some rocks under the surface have deposits of calcium carbonate. Phosphorus in the soil may be limiting at 8.0 ppm, where 10 ppm are thought necessary for normal plant growth and development. Although there is a considerable amount of bare soil, soil erosion is not a problem on the site due to the abundant vegetation cover and relatively flat terrain. The erosion condition class was determined as stable in 2002.

Prior to the fire, the site was dominated by pinyon and juniper. Now, few remain alive. Shrubs are rare and include small numbers of sprouting species, including rubber rabbitbrush, stickyleaf low rabbitbrush, and broom snakeweed. The ephedra population was estimated at 60 plants/acre in 1997 and 2002. All of the plants were classified as mature in 2002, use was moderate, and vigor normal. Wyoming big sagebrush density was estimated at 20 plants/acre on the immediate site in 2002. There is a clump of unburned juniper intermixed with sagebrush at the end of baseline which contained a higher density of pellet groups.

The majority of the vegetative cover comes from grasses, with forbs being secondary. Grasses and forbs combined to produce a total of almost 13% cover in 1997, 39% in 1998, 31% in 1999, and 19% in 2002. Cheatgrass has been the most common grass on this site in all years. Nested frequency of cheatgrass increased from 1997-1999, then decreased in 2002. It accounted for two-thirds of the total grass cover in 1998 and 1999, but only 29% in 2002. However, it was still sampled in 96% of the sampling quadrats in 2002, so it still has the potential to dominate the site when precipitation returns to normal levels. There is a good mix of seeded and native perennial grasses on the site. They have steadily increased in frequency since 1997. Common grasses include Sandberg bluegrass, crested wheatgrass, bluebunch wheatgrass, and Indian ricegrass. Less abundant species include tall wheatgrass, smooth brome, bottlebrush squirreltail, Russian wildrye, and needle-and-thread. Nearly all of the perennial grasses on the site have stable or higher nested frequency values in 2002 compared to the initial reading in 1997.

The forb component was initially quite diverse, but has steadily declined with each reading. Annual forbs were moderately abundant in 2002 with low growing species like bur buttercup and pale alyssum being the most abundant. The most common perennials initially were Douglas chaenactis and longleaf phlox. In 2002, no perennials were sampled in more than 8% of the quadrats. Sum of nested frequency has decreased in every reading since the site was established in 1997. A few seeded forbs have been sampled including alfalfa and small burnet.

1997 APPARENT TREND ASSESSMENT

The soil trend appears stable at the moment and it should improve as more vegetation becomes established in the future. Current erosion is minimal. Browse is limited to a few resprouting ephedra and some broom snakeweed. The shrub trend will likely improve as more shrubs become established on the burn. The herbaceous understory is not particularly abundant at only 12% cover. The composition of grasses is good with the exception of cheatgrass which currently accounts for 33% of the grass cover. The composition of forbs is poor. The only common species include low growing native forbs and weedy annuals. Seeded forbs occur in such low numbers that they will likely not persist on this site.

1998 TREND ASSESSMENT

Trend for soil appears to be improving and has a slightly upward trend. However, a large amount of bare soil is still exposed (28%). Vegetative cover has increased three-fold, litter cover has increased four-fold, and rock/pavement cover has declined from 32% to 22%. Unfortunately, most of the increase in vegetative cover comes from an increase in cheatgrass. There are few shrubs on the site, yet trend is considered stable. The herbaceous understory trend is down due to a significant increase and dominance in cheatgrass. Cover of cheatgrass has increased eleven-fold since 1997, and it currently accounts for 71% of the grass cover. All other grasses, with the exception of crested wheatgrass, declined in nested frequency but not significantly. Crested wheatgrass increased significantly in nested frequency but it only occurs in 15% of the quadrats. Forbs are diverse with several annual and perennial species sampled, however none are abundant. Cover of forbs has declined two-fold and nested frequency has declined three-fold since 1997.

TREND ASSESSMENT

soil - up slightly (4)

browse - stable but depleted (3)

herbaceous understory - down (1)

2002 TREND ASSESSMENT

Trend for soil is down. Bare ground increased to 45%, while litter and vegetation cover both declined. Although erosion is low, the soil surface has a moderate erosion potential. The main factor minimizing soil erosion is the gentle slope. Trend for browse is stable, but remains depleted. Very few shrubs have colonized into the site since the burn. Ephedra and rubber rabbitbrush have stable but low density populations. Trend for the herbaceous understory is slightly up. Cheatgrass significantly decreased in nested frequency, while sum of nested frequency for perennial grasses more than doubled. There is a good mix of introduced and native perennial grasses on the site. Cheatgrass remains uniformly distributed over the site and could become dominant again with better precipitation in the future.

TREND ASSESSMENT

soil - down (1)

browse - stable (3)

herbaceous understory - slightly up (4)

HERBACEOUS TRENDS --
Herd unit 21 , Study no: 20

T y p e	Species	Nested Frequency				Average Cover %			
		'97	'98	'99	'02	'97	'98	'99	'02
G	Agropyron cristatum	_a 6	_b 35	_b 36	_c 82	.27	1.50	1.63	3.56
G	Agropyron elongatum	_a -	_{ab} 3	_{ab} 4	_b 11	-	.04	.18	.36
G	Agropyron spicatum	60	41	46	65	2.20	3.90	5.94	4.08
G	Bromus inermis	-	-	1	4	-	-	.03	.01
G	Bromus japonicus (a)	-	-	-	4	-	-	-	.03
G	Bromus tectorum (a)	_a 153	_c 430	_c 454	_b 340	2.34	26.01	20.14	4.54
G	Elymus junceus	_a -	_{ab} 4	_a 1	_b 6	-	.03	.03	.16
G	Oryzopsis hymenoides	68	58	49	39	1.26	3.06	1.54	1.44
G	Poa secunda	_b 63	_b 54	_a 7	_c 110	.87	1.22	.04	1.51
G	Sitanion hystrix	16	22	12	7	.17	.78	.18	.04
G	Stipa comata	-	-	-	7	-	-	-	.03
Total for Annual Grasses		153	430	454	344	2.34	26.01	20.14	4.57
Total for Perennial Grasses		213	217	156	331	4.78	10.55	9.60	11.22
Total for Grasses		366	647	610	675	7.13	36.57	29.75	15.80
F	Alyssum desertorum (a)	_a 1	_a 2	_a 3	_b 81	.00	.00	.00	.14
F	Arabis spp.	3	-	3	-	.00	-	.07	-
F	Astragalus beckwithii	4	-	-	-	.06	.00	-	-
F	Camelina microcarpa (a)	_a -	_{ab} 6	_{ab} 3	_b 16	-	.06	.03	.22
F	Carduus nutans (a)	-	-	-	2	-	-	-	.00
F	Calochortus nuttallii	3	-	-	1	.01	-	.00	.00
F	Centaurea spp.	_a -	_b 7	_a -	_a -	-	.05	-	-
F	Chaenactis douglasii	_b 52	_b 42	_a 2	_a 8	.97	1.20	.00	.01
F	Crepis acuminata	-	-	-	-	-	.03	-	-
F	Descurainia pinnata (a)	_b 14	_a -	_a 6	_a 4	.13	-	.18	.00
F	Draba spp. (a)	-	14	-	-	-	.02	-	-
F	Eriogonum cernuum (a)	6	3	-	-	.30	.03	-	-
F	Erigeron spp.	-	3	-	-	-	.03	-	-
F	Gilia spp. (a)	_b 77	_a -	_a -	_a -	1.64	-	-	-
F	Lactuca serriola	_a 6	_b 17	_b 45	_a -	.61	.49	.37	-
F	Lesquerella spp.	_b 38	_a -	_a -	_a -	.19	-	-	-
F	Medicago sativa	1	4	3	-	.00	.18	.04	-
F	Nicotiana attenuata (a)	-	2	-	-	-	.00	-	-
F	Phlox longifolia	_c 46	_b 13	_a -	_b 17	.36	.03	-	.06
F	Ranunculus testiculatus (a)	_b 112	_a 3	_a 5	_c 271	.76	.03	.01	2.91
F	Salsola iberica (a)	-	-	5	-	-	.15	.18	.00
F	Sanguisorba minor	1	2	-	-	.15	.15	-	-

T y p e	Species	Nested Frequency				Average Cover %			
		'97	'98	'99	'02	'97	'98	'99	'02
F	Sisymbrium altissimum (a)	-	1	8	-	-	.15	.18	-
F	Streptanthus cordatus	7	-	-	-	.04	-	-	-
F	Tragopogon dubius	3	3	4	4	.03	.10	.05	.00
Total for Annual Forbs		210	31	30	374	2.84	0.46	0.60	3.29
Total for Perennial Forbs		164	91	57	30	2.44	2.28	0.53	0.09
Total for Forbs		374	122	87	404	5.28	2.74	1.13	3.38

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --

Herd unit 21 , Study no: 20

T y p e	Species	Strip Frequency				Average Cover %			
		'97	'98	'99	'02	'97	'98	'99	'02
B	Artemisia tridentata vaseyana	0	0	0	1	-	-	-	.15
B	Chrysothamnus nauseosus albicaulis	0	1	3	4	.00	-	.38	.38
B	Chrysothamnus viscidiflorus viscidiflorus	0	1	1	1	.03	.15	.00	-
B	Ephedra nevadensis	1	0	1	1	-	-	-	.00
B	Gutierrezia sarothrae	3	8	15	13	.18	.86	1.03	.65
B	Leptodactylon pungens	0	0	4	9	.00	-	-	.06
Total for Browse		4	10	24	29	0.22	1.00	1.42	1.25

BASIC COVER --

Herd unit 21 , Study no: 20

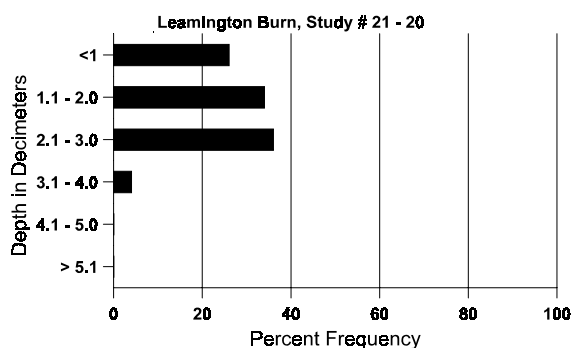
Cover Type	Nested Frequency				Average Cover %			
	'97	'98	'99	'02	'97	'98	'99	'02
Vegetation	303	444	462	429	13.11	39.16	35.04	22.46
Rock	314	251	220	257	11.08	9.00	6.96	7.53
Pavement	451	376	338	383	20.50	12.50	5.31	6.49
Litter	383	489	485	445	7.05	28.25	39.20	27.58
Cryptogams	108	9	9	16	2.08	.19	.06	.22
Bare Ground	424	372	308	433	32.10	28.43	16.73	44.74

SOIL ANALYSIS DATA --

Herd Unit 21, Study no: 20, Leamington Burn

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
13.7	62.0 (13.5)	7.0	46.7	28.4	24.8	2.4	8.0	214.4	0.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 21 , Study no: 20

Type	Quadrat Frequency				Pellet Groups per Acre	Days Use per Acre (ha)
	'97	'98	'99	'02	'02	'02
Rabbit	15	1	24	14	-	-
Elk	-	1	4	-	17	1 (3)
Deer	1	1	1	1	9	1 (2)
Cattle	1	-	2	5	157	13 (32)

BROWSE CHARACTERISTICS --

Herd unit 21 , Study no: 20

Period Unit 21, Study No. 20																		
A Y G R E		Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Artemisia tridentata vaseyana																		
M	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	11	9	0
	02	1	-	-	-	-	-	-	-	-	1	-	-	-	20	9	11	1
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>				
	'97	00%				00%				00%								
	'98	00%				00%				00%								
	'99	00%				00%				00%								
	'02	00%				00%				00%								
Total Plants/Acre (excluding Dead & Seedlings)														'97	0	Dec:	-	
														'98	0		-	
														'99	0		-	
														'02	20		-	

A G R E	Y R E	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Atriplex canescens																		
M	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	46	33	0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0	24	32	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'97			00%			00%			00%							
		'98			00%			00%			00%							
		'99			00%			00%			00%							
		'02			00%			00%			00%							
Total Plants/Acre (excluding Dead & Seedlings)												'97	0	Dec:	-			
												'98	0		-			
												'99	0		-			
												'02	0		-			
Chrysothamnus nauseosus albicaulis																		
Y	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	98	1	-	-	-	-	-	-	-	-	-	1	-	-	20			1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	1	-	-	-	-	-	-	-	-	-	1	-	-	20			1
M	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	3	-	-	-	-	-	-	-	-	-	3	-	-	60	27	27	3
	02	2	1	1	-	-	-	-	-	-	-	4	-	-	80	30	38	4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'97			00%			00%			00%							
		'98			00%			00%			+67%							
		'99			00%			00%			+40%							
		'02			20%			20%			00%							
Total Plants/Acre (excluding Dead & Seedlings)												'97	0	Dec:	-			
												'98	20		-			
												'99	60		-			
												'02	100		-			
Chrysothamnus viscidiflorus viscidiflorus																		
M	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	1	-	-	-	-	-	-	-	-	-	1	-	-	20	-	-	1
	99	2	-	-	-	-	-	-	-	-	-	2	-	-	40	13	18	2
	02	2	-	-	-	-	-	-	-	-	-	2	-	-	40	13	18	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		'97			00%			00%			00%							
		'98			00%			00%			+50%							
		'99			00%			00%			+ 0%							
		'02			00%			00%			00%							
Total Plants/Acre (excluding Dead & Seedlings)												'97	0	Dec:	-			
												'98	20		-			
												'99	40		-			
												'02	40		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Ephedra nevadensis																		
Y	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40	19	34	
	02	-	3	-	-	-	-	-	-	-	3	-	-	-	60	21	38	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%										
'98		00%			00%			00%										
'99		00%			00%			00%			+33%							
'02		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	60	Dec:	-			
												'98	0		-			
												'99	40		-			
												'02	60		-			
Gutierrezia sarothrae																		
S	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	97	3	-	-	-	-	-	8	-	-	3	-	-	-	220	-	11	
	98	12	-	-	-	-	-	-	-	-	12	-	-	-	240	12	20	
	99	25	-	-	-	-	-	-	-	-	25	-	-	-	500	12	20	
	02	14	-	-	-	-	-	-	-	-	14	-	-	-	280	7	13	
D	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	02	3	-	-	-	-	-	1	-	-	2	-	-	2	80		4	
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%			+ 0%							
'98		00%			00%			00%			+54%							
'99		00%			00%			00%			-31%							
'02		00%			00%			11%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	240	Dec:	0%			
												'98	240		0%			
												'99	520		0%			
												'02	360		22%			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Juniperus osteosperma																	
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>			
'97		00%				00%				00%							
'98		00%				00%				00%							
'99		00%				00%				00%							
'02		00%				00%				00%							
Total Plants/Acre (excluding Dead & Seedlings)												'97	0	Dec:	-		
												'98	0		-		
												'99	0		-		
												'02	0		-		
Leptodactylon pungens																	
Y	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40	3	2
	02	13	-	-	-	-	-	-	-	-	13	-	-	-	260	5	13
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>			
'97		00%				00%				00%							
'98		00%				00%				00%							
'99		00%				00%				00%				+69%			
'02		00%				00%				00%							
Total Plants/Acre (excluding Dead & Seedlings)												'97	0	Dec:	-		
												'98	0		-		
												'99	80		-		
												'02	260		-		

Trend Study 21-21-02

Study site name: Leamington Burn and Chain

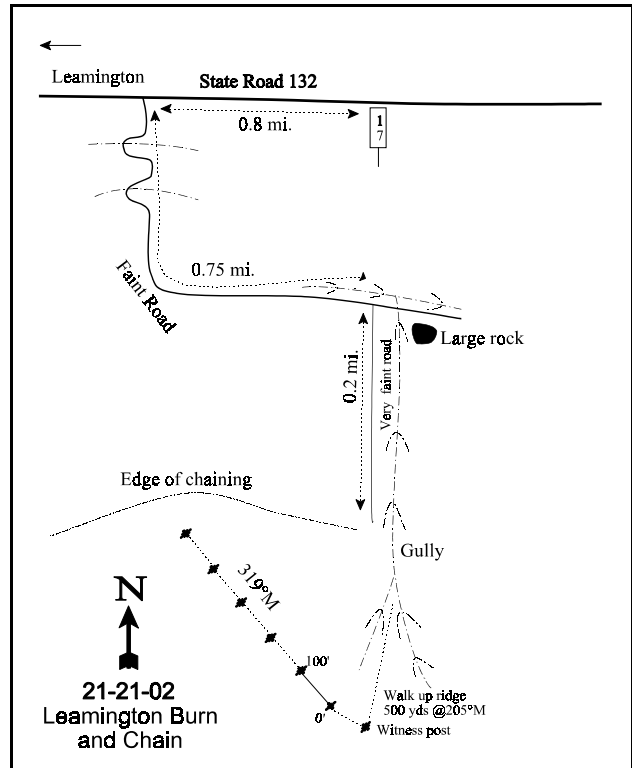
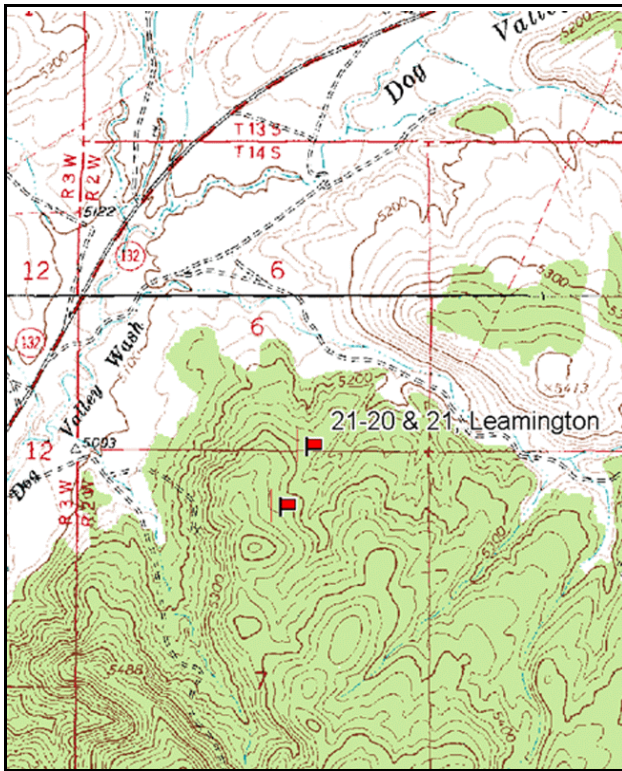
Vegetation type: Chained and Burned P-J

Compass bearing: frequency baseline 319 degrees magnetic.

Frequency belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft). Rebar: belt 4 on 3ft.

LOCATION DESCRIPTION

From Nephi, drive about 17.1 miles on State Road 132. Drive west 0.8 miles past mile marker 17 to a faint road on the left. Drive 0.75 miles past a water trough to a gully with a large boulder by the road. Go up the gully 0.2 miles to where it forks. Park here. From where the drainage divides in two, walk up the middle ridge about 500 yards at a bearing of 205 degrees magnetic to a witness post. The 0-foot stake is 20 feet from the witness post at about 319 degrees magnetic. The study is marked by 12-18 inch, green, steel fenceposts.



Map name: Sage Valley

Diagrammatic Sketch

Township 14S Range 2W Section 6

GPS: NAD 27, UTM 12S 4385763 N 404379 E

DISCUSSION

Leamington Burn and Chain - Trend Study No. 21-21

This study was established in 1997 to sample a burned, seeded, and chained area west of the Leamington Burn site (21-20). It was established to contrast secondary succession and establishment of seeded grasses and forbs with the nearby burned and seeded treatment that made no attempt to cover the seed. This site has a slope of 10% to 12% with a east-southeast aspect at an elevation of 5,300 feet. The area burned during the summer of 1996 and is part of the previously mentioned Leamington burn complex. Seed was aerially applied and then the site was one-way chained with an Ely chain to cover the seed and enhance establishment of seeded species. The area has had very little use by wildlife in all readings. Pellet group transect data indicated <1 deer and 1 elk use day/acre in 1997, and up to 8 elk days use/acre (20 edu/ha) by 1998. In 2002, pellet transect data estimated 3 elk days use/acre (8 edu/ha), and less than 1 deer day use/acre (2 ddu/ha). Cattle were grazing in the area when the site was read in 2002. Cattle use was estimated at only 9 days use/acre (21 cdu/ha) on the immediate site, although use was much higher in the bottoms below the site.

Soil on the site is very similar to the Leamington Burn site (21-20). Effective rooting depth is estimated at almost 14 inches. Rocks and pavement are abundant on the surface and are also common throughout the soil profile. Soil texture is a sandy clay loam with a neutral pH (7.0). Percent organic matter was higher compared to the burn and seeded site (3% vs 2.4%). Percent bare ground was quite high at 39% in 1997, declining to 29% in 2002. Herbaceous vegetation and litter are moderately abundant and well dispersed and minimize erosion. The erosion condition class was determined to be stable in 2002.

Browse is limited to some seeded fourwing saltbush that was applied with a seed dribbler, and a few rubber rabbitbrush, stickleaf low rabbitbrush, and ephedra. Broom snakeweed has the highest density of all browse species in all readings.

The herbaceous understory, especially grasses, is the dominant vegetative type on the site. Perennial grasses, primarily seeded exotics, have steadily increased over the site since the first reading in 1997. The most common perennial grass is crested wheatgrass. This species has had a stable nested frequency in all years. It provides nearly 30% of the total grass cover in 1999 and 2002. Tall wheatgrass has significantly increased in nested frequency since 1997, providing 21% of the grass cover in 2002. Other seeded species include smooth brome, orchard grass, and Russian wildrye. Native grasses are also well represented although they are less abundant than the seeded species. Bluebunch wheatgrass has a low frequency, but plants are large and vigorous and provide 18% of the total grass cover in 2002. Other native perennials include western wheatgrass, mutton bluegrass, Indian ricegrass, and Sandberg bluegrass. In 1998, perennial grasses were noted as being vigorous and robust with some reaching 3 to 4 feet in height. In 2002, perennial grasses had been moderately utilized over the entire site, with some of the large bunchgrasses having been heavily used. Cheatgrass is present on the site, but occurs in lower numbers compared to study 21-20. Cheatgrass accounted for 15% of the grass cover in 1997, 34% in 1998, 42% in 1999, and 23% in 2002. Cheatgrass nested frequency increased in 1998 and 1999, but declined in 2002 with drought. Even with the decline in 2002, it was still sampled in 89% of the quadrats and remains uniformly distributed over the site. Cheatgrass appears to have reached its peak, and with a good stand of competitive perennial grasses on the site, it should be held in check in the future.

The forb component has been fairly diverse, but all species occur infrequently. Forb cover was highest in 1997 at only 2%. It has decreased with every reading since. In 2002 with drought conditions, forbs were insignificant. Alfalfa and small burnet were seeded on the site, but have been sampled in only a handful of quadrats.

1997 APPARENT TREND ASSESSMENT

The soil trend appears stable due to the good establishment of seeded and native herbaceous species along with litter cover provided by chained dead trees. Grasses and forbs will increase in the future and provide even more soil protection. The browse trend will depend on how well the seeded fourwing saltbush becomes established. The few plants seeded around the site are vigorous and will likely increase in the future. The herbaceous understory is diverse with 8 perennial grasses and 11 perennial forbs encountered. There are fewer annual forbs here than on the adjacent site (21-20). There is nothing to suggest that the herbaceous trend will not continue to improve in the future.

1998 TREND ASSESSMENT

Trend for soil is improving as more perennial vegetation becomes established on the site. Percent cover of bare ground has declined from 39% to 27%, which is still high, but erosion is not currently a problem due to the well dispersed vegetation and litter cover. The browse trend is up slightly due to an increase in density of browse. Shrubs are still in low numbers but some fourwing saltbush and ephedra are becoming established. Broom snakeweed is still the most abundant shrub on the site even though the density has declined slightly since 1997. Trend for the herbaceous understory is up for grasses yet down slightly for forbs. Grasses increased in cover from 9% in 1997 to 29% in 1998. Cheatgrass is the most abundant grass on the site with a significant increase in nested frequency and a seven-fold increase in cover since 1997. It currently accounts for 34% of the grass cover even though plants are small in stature compared to the perennial grasses. The most common perennial grass, crested wheatgrass, remained at a similar frequency compared to 1997. Most of the other perennial grasses increased significantly in nested frequency. Forbs are not abundant and declined slightly in nested frequency since 1997. However, much of the change is due to several annual forbs disappearing from the site. Trend for the herbaceous understory is considered slightly up.

TREND ASSESSMENT

soil - slightly up (4)

browse - up slightly but still depleted (4)

herbaceous understory - slightly up (4)

2002 TREND ASSESSMENT

Trend for soil is stable. Compared to the 1999 data, bare ground increased in 2002 with drought conditions, but herbaceous vegetation and litter have remained steady, and erosion is minimal. The erosion condition class was determined as stable. Trend for browse is stable, but the browse component is very limited. Fourwing saltbush, ephedra, Wyoming big sagebrush, white-stemmed rubber rabbitbrush, and bitterbrush are scattered around the site in very low densities. Although these species remain on the site, they haven't increased since the initial reading in 1997. Trend for the herbaceous understory is stable overall. Perennial grasses have increased in sum of nested frequency since the 1999 reading, but perennial forbs have decreased. Cheatgrass declined in nested frequency and cover, but still remains moderately abundant and well distributed over the site.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3) but limited

herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 21 , Study no: 21

T y p e	Species	Nested Frequency				Average Cover %			
		'97	'98	'99	'02	'97	'98	'99	'02
G	Agropyron cristatum	144	152	130	132	3.69	6.94	5.96	5.63
G	Agropyron elongatum	_a 39	_{bc} 96	_{ab} 74	_c 113	.98	4.71	2.33	4.30
G	Agropyron smithii	-	-	-	5	-	-	-	.03
G	Agropyron spicatum	27	47	31	47	1.25	3.46	2.72	3.67
G	Bromus inermis	_a 9	_{ab} 30	_{ab} 20	_b 39	.22	.73	.65	.24
G	Bromus japonicus (a)	-	-	-	3	-	-	-	.03
G	Bromus tectorum (a)	_a 98	_{bc} 318	_c 351	_b 294	1.35	9.86	9.38	4.69
G	Dactylis glomerata	_b 18	_b 28	_{ab} 10	_a -	.70	.65	.09	-
G	Elymus junceus	_a -	_b 22	_a 3	_b 27	-	.91	.15	.67
G	Oryzopsis hymenoides	26	28	25	17	.37	1.47	.95	.35
G	Poa fendleriana	4	-	-	-	.01	-	-	-
G	Poa secunda	_a 4	_{ab} 19	_a 11	_b 38	.06	.58	.05	.61
Total for Annual Grasses		98	318	351	297	1.35	9.86	9.38	4.73
Total for Perennial Grasses		271	422	304	418	7.30	19.46	12.91	15.55
Total for Grasses		369	740	655	715	8.66	29.33	22.29	20.28
F	Alyssum desertorum (a)	_a -	_{ab} 2	_{ab} 4	_b 10	-	.00	.00	.03
F	Astragalus beckwithii	3	-	-	5	.00	-	-	.04
F	Astragalus calycosus	12	7	14	1	.12	.09	.07	.00
F	Astragalus spp.	6	6	3	-	.18	.19	.03	-
F	Camelina microcarpa (a)	-	2	-	-	-	.03	-	-
F	Carduus nutans (a)	_b 16	_a -	_a -	_a -	.04	-	-	-
F	Calochortus nuttallii	-	-	-	-	.00	-	-	-
F	Chaenactis douglasii	_b 10	_{ab} 10	_a -	_a -	.32	.24	-	-
F	Cryptantha spp.	1	-	-	-	.00	-	-	-
F	Descurainia pinnata (a)	_b 15	_a 1	_a -	_a -	.10	.02	-	-
F	Draba spp. (a)	-	1	1	-	-	.00	.00	-
F	Gilia spp. (a)	_b 23	_a -	_a -	_a -	.92	-	-	-
F	Lactuca serriola	_a -	_b 15	_b 30	_a -	-	.38	.53	-
F	Lesquerella spp.	5	4	-	-	.01	.16	-	-
F	Medicago sativa	1	4	1	1	.11	.29	.01	.03
F	Nicotiana attenuata (a)	1	-	-	-	.00	-	-	-
F	Phlox hoodii	-	1	1	4	-	.00	.00	.18
F	Phlox longifolia	4	-	3	-	.01	-	.00	-
F	Ranunculus testiculatus (a)	_a 7	_a -	_a -	_b 52	.02	-	-	.24
F	Salsola iberica (a)	-	-	1	-	-	-	.00	-
F	Sanguisorba minor	2	3	2	-	.15	.18	.03	-
F	Senecio multilobatus	-	2	-	-	-	.03	-	-

T y p e	Species	Nested Frequency				Average Cover %			
		'97	'98	'99	'02	'97	'98	'99	'02
F	Sisymbrium altissimum (a)	-	-	1	-	-	-	.03	-
F	Streptanthus cordatus	_b 8	_a -	_a -	_a -	.02	-	-	-
F	Tragopogon dubius	-	-	4	-	-	-	.00	-
Total for Annual Forbs		62	6	7	62	1.09	0.05	0.04	0.27
Total for Perennial Forbs		52	52	58	11	0.95	1.57	0.69	0.25
Total for Forbs		114	58	65	73	2.05	1.63	0.74	0.52

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --

Herd unit 21 , Study no: 21

T y p e	Species	Strip Frequency				Average Cover %			
		'97	'98	'99	'02	'97	'98	'99	'02
B	Atriplex canescens	0	1	1	1	.03	-	-	.15
B	Chrysothamnus viscidiflorus viscidiflorus	0	1	0	0	-	-	-	-
B	Ephedra nevadensis	0	1	0	1	-	-	-	.00
B	Gutierrezia sarothrae	16	11	22	19	.07	.59	.52	.31
B	Purshia tridentata	0	1	1	0	-	-	-	-
Total for Browse		16	15	24	21	0.10	0.59	0.52	0.46

BASIC COVER --

Herd unit 21 , Study no: 21

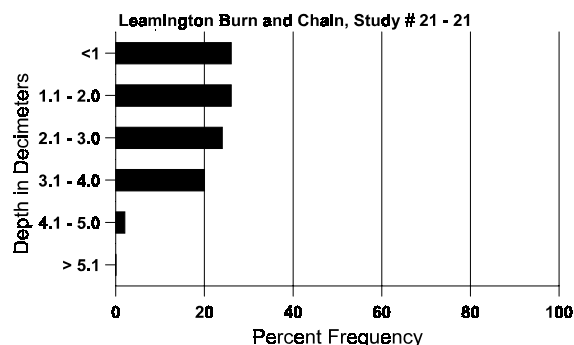
Cover Type	Nested Frequency				Average Cover %			
	'97	'98	'99	'02	'97	'98	'99	'02
Vegetation	257	406	409	397	10.43	34.11	25.44	24.21
Rock	372	350	335	357	16.54	20.72	15.36	20.31
Pavement	444	380	342	381	13.43	10.18	3.30	5.80
Litter	388	476	446	473	9.42	27.58	21.86	30.73
Cryptogams	45	-	-	8	1.96	0	0	.01
Bare Ground	446	402	402	379	39.39	27.02	21.77	29.36

SOIL ANALYSIS DATA --

Herd Unit 21, Study no: 21, Leamington Burn and Chain

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.8	62.8 (14.4)	7.0	46.0	33.1	20.9	3.0	12.3	195.2	0.9

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 21 , Study no: 21

Type	Quadrat Frequency				Pellet Groups per Acre	Days Use per Acre (ha)
	'97	'98	'99	'02	'02	'02
Rabbit	2	3	11	5	-	-
Elk	1	4	2	-	44	3 (8)
Deer	3	-	1	2	9	1 (2)
Cattle	-	-	4	2	104	9 (21)

BROWSE CHARACTERISTICS --

Herd unit 21 , Study no: 21

Field unit 21, Study No. 21																	
A Y G R E		Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Artemisia tridentata vaseyana																	
M	'97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	
	'98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	
	'99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	
	'02	-	-	-	-	-	-	-	-	-	-	-	-	-	0	17 24	
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>			
	'97	00%				00%				00%							
	'98	00%				00%				00%							
	'99	00%				00%				00%							
	'02	00%				00%				00%							
Total Plants/Acre (excluding Dead & Seedlings)												'97	0	Dec:	-		
												'98	0		-		
												'99	0		-		
												'02	0		-		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Atriplex canescens																		
S	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20	34	41	
	99	-	-	-	-	-	-	-	-	1	1	-	-	-	20	31	28	
	02	1	-	-	-	-	-	-	-	-	1	-	-	-	20	26	30	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%										
'98		00%			00%			00%			+ 0%							
'99		00%			100%			00%			+ 0%							
'02		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	0	Dec:	-			
												'98	20		-			
												'99	20		-			
												'02	20		-			
Chrysothamnus nauseosus albicaulis																		
M	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	23	20	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	27	26	
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0	12	12	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%										
'98		00%			00%			00%										
'99		00%			00%			00%										
'02		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	0	Dec:	-			
												'98	0		-			
												'99	0		-			
												'02	0		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Chrysothamnus viscidiflorus viscidiflorus																		
Y	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	-	-	1	-	20		1	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	18	31	0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%										
'98		00%			00%			100%										
'99		00%			00%			00%										
'02		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	0	Dec:	-			
												'98	20		-			
												'99	0		-			
												'02	0		-			
Ephedra nevadensis																		
Y	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	-	1	-	-	20		1	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0	16	22	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	11	28	0
	02	1	-	-	-	-	-	-	-	-	-	1	-	-	20	19	28	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%										
'98		00%			00%			00%										
'99		00%			00%			00%										
'02		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	0	Dec:	-			
												'98	20		-			
												'99	0		-			
												'02	20		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Gutierrezia sarothrae																		
S	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	1	-	-	-	-	-	-	-	-	-	1	-	-	20		1	
	99	1	-	-	-	-	-	-	-	-	-	1	-	-	20		1	
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	5	-	-	-	-	-	-	-	-	-	5	-	-	100		5	
	02	2	-	-	-	-	-	-	-	-	-	2	-	-	40		2	
M	97	25	-	-	-	-	-	-	-	-	-	25	-	-	500	-	25	
	98	20	-	-	-	-	-	-	-	-	-	20	-	-	400	12	20	
	99	36	-	-	-	-	-	-	-	-	-	36	-	-	720	11	36	
	02	27	-	-	-	-	-	-	-	-	-	27	-	-	540	6	27	
D	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	02	5	-	-	-	-	-	-	-	-	-	1	-	-	100		5	
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%			-20%							
'98		00%			00%			00%			+51%							
'99		00%			00%			00%			-17%							
'02		00%			00%			12%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	500	Dec:	0%			
												'98	400		0%			
												'99	820		0%			
												'02	680		15%			
Juniperus osteosperma																		
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	60		3	
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'97		00%			00%			00%										
'98		00%			00%			00%										
'99		00%			00%			00%										
'02		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'97	0	Dec:	-			
												'98	0		-			
												'99	0		-			
												'02	0		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total
		1	2	3	4	5	6	7	8	9	1	2	3	4			
Purshia tridentata																	
Y	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	98	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
	'97	00%			00%			00%									
	'98	00%			00%			00%			+ 0%						
	'99	00%			00%			00%									
	'02	00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'97	0	Dec:	-		
												'98	20		-		
												'99	20		-		
												'02	0		-		

SUMMARY

Summary and Comparison between Leamington Burn (21-20) and Leamington Burn and Chain (21-21)

Studies 21-20 and 21-21 were established in 1997 to monitor the recovery of the vegetation community on two treatments following the Leamington wildfire complex that burned in 1996. These studies were paired to compare differences in restoration efforts between seeding only (21-20) and seeding followed by one-way chaining (21-21) to cover the seed and enhance establishment of the seeded species. Both of these studies were seeded with the same seed mix.

As with the previous fire rehabilitation studies, the herbaceous understory, primarily the grass component, dominates the vegetation community at the Leamington sites. Perennial grasses have had higher cover and sum of nested frequency values on the burned, seeded, and chained site than on the burned, seeded, and unchained site in all years (Figures 1 and 2). The importance of chaining following seeding is to increase the

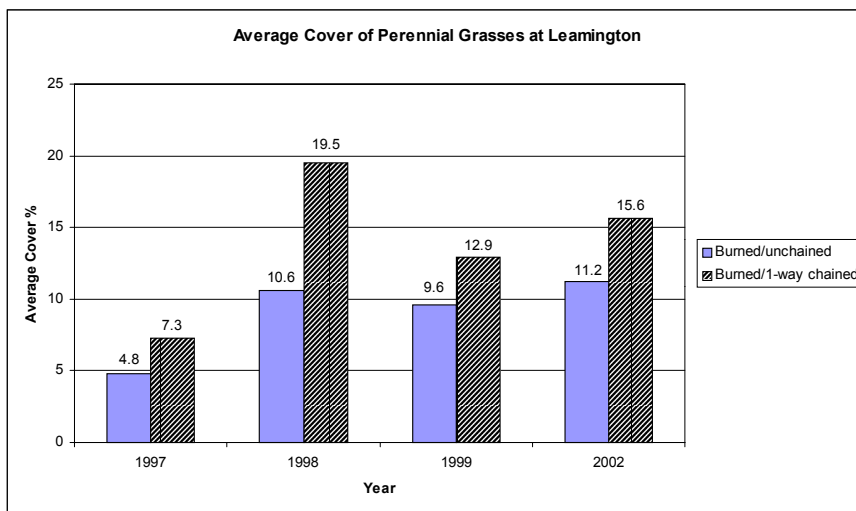


Figure 1. A comparison of percent cover values for perennial grasses from 1997-2002 on the Leamington fire rehabilitation studies.

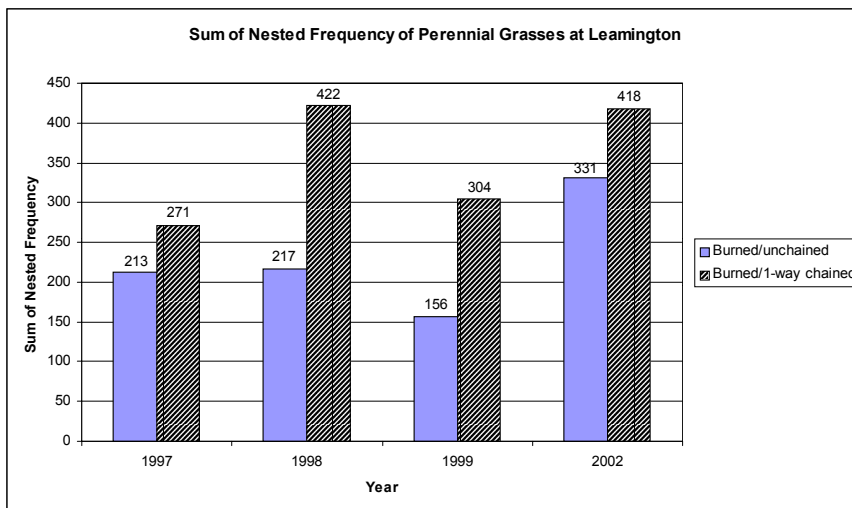


Figure 2. A comparison of sum of nested frequency values for perennial grasses from 1997-2002 on the Leamington fire rehabilitation studies.

number of safe sites for seeds to establish, and to cover the seed so it is not laying exposed on the soil surface. Getting perennial grasses established during the first growing season following seeding is critical to ensure the site does not become dominated by cheatgrass. Figures three and four show the cover and nested frequency values for cheatgrass between the two sites. Cheatgrass had a higher nested frequency value on the site that was burned, seeded, and unchained compared to the site that was burned, seeded, and chained, both initially and five years after the treatments were conducted. Percent cover of cheatgrass was higher the first three readings on the unchained site, and nearly the same on both sites in 2002, five years after treatment.

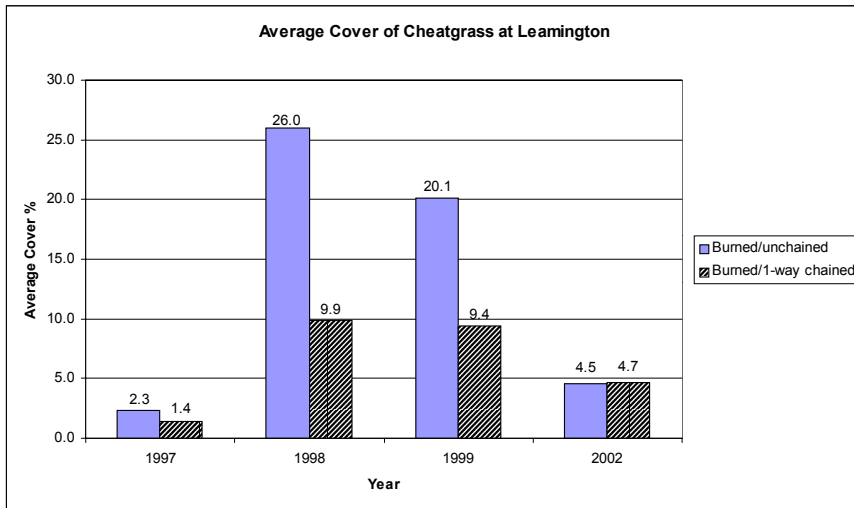


Figure 3. A comparison of percent cover of cheatgrass from 1997-2002 on the Leamington fire rehabilitation studies.

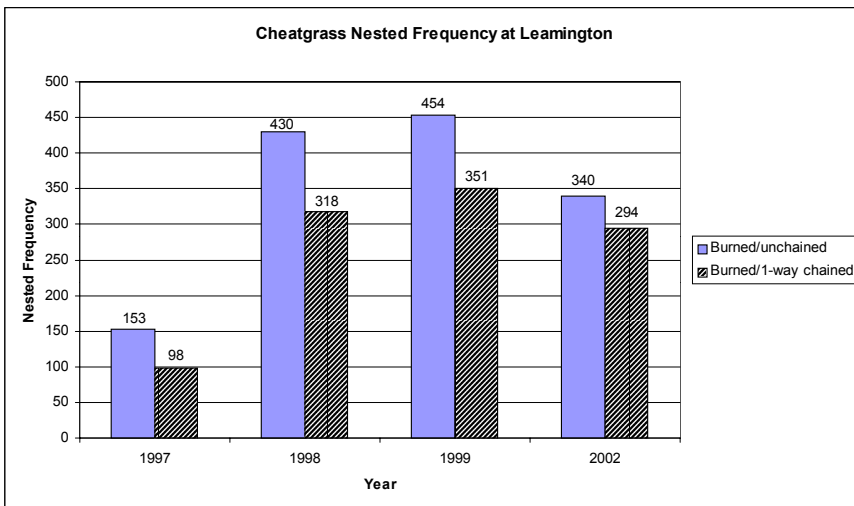


Figure 4. A comparison of cheatgrass nested frequency values from 1997-2002 on the Leamington fire rehabilitation studies.

Forbs have actually been more abundant on the unchained site at Leamington. Although both sites have a very limited and poor forb component, cover and sum of nested frequency values for perennial forbs were higher the first two years on the unchained site, and about equal on both sites in 1999 and 2002. The seeded forbs, alfalfa and small burnet, have been virtually non-existent on both sites in all readings. The browse component on both sites is very sparse. Fourwing saltbush was seeded with a dribbler, but occurs only sporadically on either site.